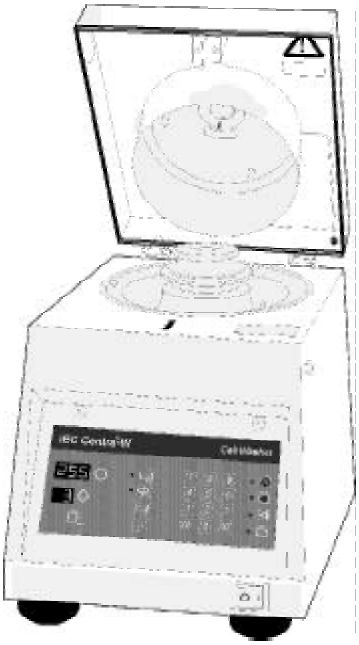
SERVICE MANUAL
SM2392

Revision 1



Centra-W
Cell Washer
Cat. No. 2392 -- For 100/120/220/240 VAC, 50/60 Hz

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IMPORTANT

This manual may not contain information on all changes that have occurred to the subject instrument since the manual issue date. It was prepared for use by IEC authorized factory-trained service or dealer personnel who are kept current through a program of service letters and bulletins and training seminars.

This manual contans WARNINGS against operating procedures which could result in an accident and/or personal injury. It also contains CAUTIONS against procedures which could result in damage to your centrifuge or accessory equipment. Read this manual thoroughly before operating or servicing this centrifuge.

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1 DESCRIPTION

The Model Centra-W Cell Washer is manufactured by the International Equipment Company. This benchtop cell washer is used to automatically perform the washing phase of the anti-globulin procedure in tests using up to six drops of blood sample. The cell washer will accommodate either twelve 12 x 75 mm tubes, or twelve 10 x 75 mm tubes. It is registered as a device in accordance with FDA regulations governing the distribution and use of such products.

The Cell Washer incorporates a power entry module which permits you to select operation with 100, 120, 220, 230 or 240 Vac, 50/60 Hz power.

The Centra-W cell washer contains a microprocessor-controlled centrifuge and a peristaltic pump for dispensing saline solution.

A cabinet supports a centrifugation chamber which is a removable plastic guard bowl. A drive assembly is mounted to the cabinet base. An induction motor is mounted to the drive assembly providing brushless operation. The motor has permanently-sealed self-lubricating ball bearings. The motor shaft projects through the center of the guard bowl. A solenoid plunger and a rotor is set on the motor shaft. A cover assembly forms the top section of the chamber. The aluminum cover assembly consists of a feed-dispensing nozzle for inserting saline solution into the tubes in the rotor, a cylindrical splash guard for directing the decanted waste into the drain hole in the chamber, a latch, and a viewport for easy speed verification.

When the cover is closed and latched, an interlock prevents the cover from opening when the rotor is in motion. The interlock also prevents operation when the cover is not closed and latched except in the CALIBRATE and AGITATE mode. The remaining electrical and electronic components, along with the saline solution peristaltic pump and the rotor drive assembly, are located on the base section of the cabinet.

2 INSTALLATION

2.1 Receiving Inspection

The Cell Washer is shipped in a special carton designed to protect it from hazards in transit. Before signing the delivery receipt and accepting the shipment, inspect the shipping carton for any signs of mishandling, such as broken or dented sides or SHOCKWATCH® activation. Any observed damage must be stated, in writing, on the delivery receipt **before** signing the receipt. A normal or undamaged carton does not necessarily ensure that the contents are undamaged. If mishandling or shipping damage is suspected, contact the office of the carrier so that a representative may be called in to witness the unpacking. IEC is not responsible for damage incurred in transit.

2.2 Unpacking

CAUTION: The Cell Washer weighs 45 lbs. (20.4 kg). Unpacking and installation may require two people. Do not use any sharp instrument to open the inner carton packaging, damage to the instrument may result.

Note: Refer to Figure 2-1 while unpacking.

1. Remove the small box containing the rotor (Figure 2-1).
2. Remove the Power Cords and fuses.
3. Remove the top cardboard supports.
4. Remove the cardboard protector from the Cell Washer.
5. Grip the cell washer under the top edge of the front panel and under the top edge of the pump enclosure and lift it free of the carton. (Have someone hold the carton, if necessary).
6. Place the cell washer on a sturdy, level bench near a waste container or drain to receive decanted saline.

CAUTION: **The bottom of the cell washer must be high enough so that the drain hose is pitched downward from the unit to the drain, with no restriction to gravity flow. The drain hose may not be extended or constricted. Reduction of the drain flow can cause saline back up resulting in serious corrosion damage.**

Allow a minimum of 12 cm (5 in.) of clearance on all sides of the cell washer for proper air cooling circulation.

Do not plug in the power cord. The Cell Washer should not be turned on at this time.

7. Carefully inspect the cell washer for external damage. Any damage discovered which is attributable to mishandling or shipping should be documented, and a signed inspection report should be furnished to the shipping company.

8. Complete the warranty registration card and return it to IEC.

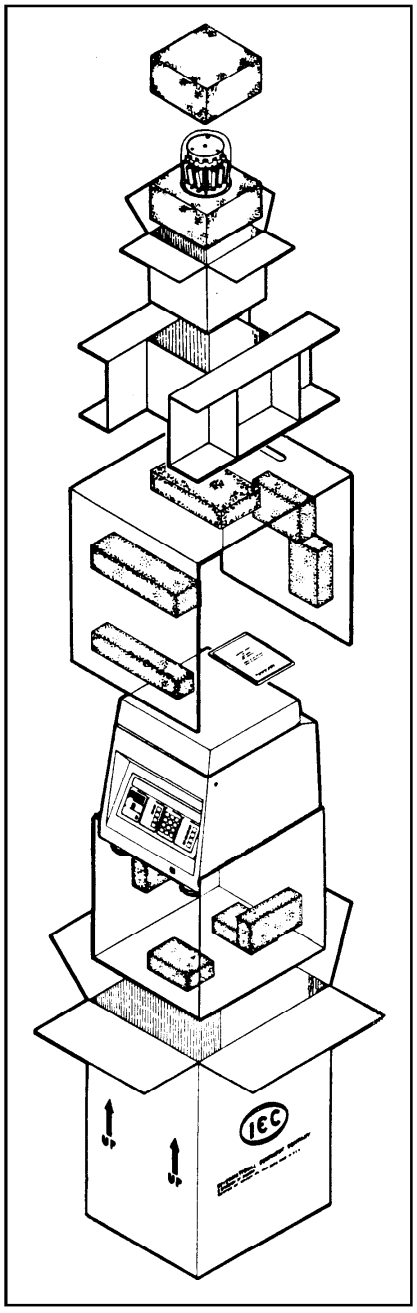


Figure 2-1 Unpacking

2.3 Power Configuration

The Cell Washer uses AC power at 100,120, 220, 230 or 240 volts, at 50 or 60 Hz. The unit is shipped without fuses installed and must be configured for power at your site. **Do not plug in the cell washer until you have configured it correctly.** Variations in line voltage or frequency will affect the unit's speed and other characteristics.

Caution: configuring the cell washer incorrectly will void your warranty.

Voltage

Note: Refer to figure 2-2 while performing this procedure.
Locate the power entry module on the rear of the unit (Figure 2-2). On the right side of this module is the fuse drawer. A small latch on the left holds the drawer in place. Press the latch and slide the drawer out. When removing the fuse drawer, be careful that the fuses do not fall out.

If the number visible in the window differs from the voltage at your site, remove the square insert, rotate it, and reinstall it so that the correct voltage is displayed through the window and insert appropriate fuse value (see chart below).

Note: Use 240V fuse drawer position for 230V service.

CAUTION: This instrument must be configured for the correct line voltage and must have correct fuse values. Incorrect settings may cause fuses to blow and/or cause damage to electrical controls.

Fuses

From the following table, determine the correct fuses. Insert two fuses in the fuse drawer and replace the fuse drawer in the power entry module. Make sure it locks into place.

Voltage	Fuse	Cat No.
100V/120V	250V 5A T	49946
220V/230V/240V	250V 2.5A T	49937

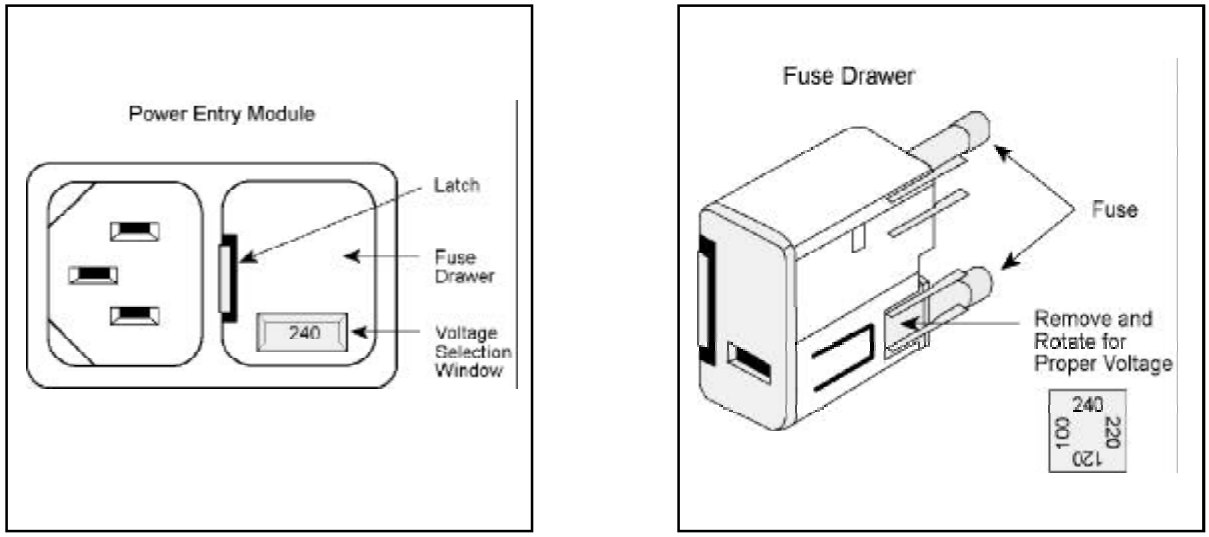


Figure 2-2 Voltage Selection

Power Cord

The unit requires a grounded power supply (3-prong receptacle). If your facility does not have properly grounded power outlets, arrange for proper grounding. Do not remove the power cord plug to attach a power plug that does not have a grounding pin.

WARNING: Grounding - this instrument is equipped with a three prong plug for safety purposes. The wall outlet must be a three wire receptacle (one being GROUND). If the outlet is not, then contact an electrician for wiring changes.

The unit is provided with two power cords. One is suitable for North America and Japan. The other is a “Continental Europe” type. Attach the appropriate power cord to the power entry module receptacle on the Cell Washer. Do not connect to AC outlet at this time.

2.4 Tubing Installation

The cell washer is shipped with the pump tubing already installed in the peristaltic pump at the rear of the cell washer. The saline supply tubing (including volume control flow valve and supply adapter) is also connected (by a 90° elbow) to the pump tubing which extends from the pump. Connect the saline supply tubing to a saline solution supply container using the adapter.

NOTE: The cell washer has a gravity drain. Therefore be sure the drain tubing flows downward and that it is not restricted in any way. For best results, locate the cell washer next to a sink for draining purposes. Periodically inspect the drain tubing to ensure its proper operation. If the drain line becomes kinked or restricted, drained liquid can back up the drain hose and into the motor compartment causing motor failure.

3 OPERATION

3.1 Control Panel

The membrane control panel contains switches which are actuated by pressure. The switches will sound (beep) when pressed. Indicators light when corresponding keys are pressed.

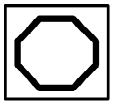
Power Switch

The Power Switch is located at the front lower-right of the cabinet. This On-Off rocker switch is used to control the main power coming from the line cord at the rear of the cabinet. When the Power Switch is pushed to the ON position the STOP and the OPEN COVER light emitting diode (LED) indicators on the control panel will light and zeroes will appear in the TIME and CYCLE digital displays.

Run

This key is used to start the wash or spin run. The indicator to the left of this key will light when the RUN key is pressed, indicating that the instrument is in the run mode.

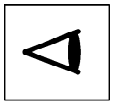
Stop



This key may be used at any time and in any mode to stop a run. The indicator to the left of this key will light when the stop key is pressed, indicating that the unit is in the brake mode.

Note: No changes can be made during a run. All keys are disabled except for the STOP and CHECK keys.

Check

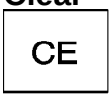


This key is used to temporarily interrupt a wash cycle at the end of its current phase (i.e. at the end of fill, spin, decant, or agitate). The cover may be opened (by pressing the OPEN COVER key once the OPEN COVER LED lights) for access to the rotor. Closing the cover and pressing the RUN key will resume the wash cycle run where it was interrupted. The check function can only be used in the wash mode. The indicator to the left of this key lights when the CHECK key is pressed to signal that the unit is in the check mode.

Open Cover

This key is used to power the cover solenoid and open the cover. The indicator to the left of this key will light whenever the Power Switch is in the On position and the rotor is stopped. Press the OPEN COVER key to release the cover.

Clear

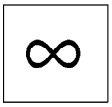


This key is used to clear the currently displayed TIME or CYCLE numbers.

Numbers

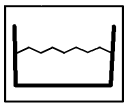
These keys are used to select the desired number of wash cycle(s) in the wash mode (1-4), or to select the duration of a timed (1-999 seconds) spin mode. The selected time in seconds will appear in the TIME display.

Hold



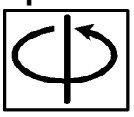
This key is used to select an indefinitely timed spin run.

Wash



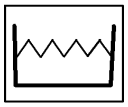
This key is used with the 1, 2, 3 or 4 number keys to enter the desired wash cycle(s). The indicator to the left of this key will light when the WASH key is pressed indicating that the instrument is in the wash mode. A beep will sound at the end of the wash cycle.

Spin



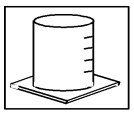
This key is used with the appropriate number (0 through 9) key(s) to use the cell washer as a centrifuge at 2800 rpm (50 Hz) or 3400 rpm (60 Hz) in a timed (from 1 to 999 seconds) run or in an untimed run using the HOLD key. The indicator to the left of this key lights when the SPIN key is pressed indicating that the unit is in the spin mode.

Agitate



This key is used to select a six-second agitation for resuspension of the cell button.

Calibrate

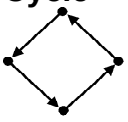


This key is used to select the calibrate mode in order to set the correct volume of saline solution dispensed for each test tube. It is also used in priming the peristaltic pump.

Time

This digital display will show the total time of the spin, or wash, cycle(s) at the start and the remaining time while running. Time shows a maximum of 999 seconds, or 000 for HOLD.

Cycle



This digital display will show the number of wash cycles initially selected, and during the run, the current wash cycle(s) left.

Saline

This indicator lights when the saline solution reservoir is depleted. An alarm also sounds. The cell washer defaults to the check mode, allowing the user to hand-fill the tubes, and to prime the pump system. Pressing the RUN key will resume the run.

3.2 Description of Operation

The cell washer can be programmed to run up to four wash cycles. Each basic 80-second wash cycle run is stored in the cell washer system memory until the CLEAR key is pressed, the power switch is pushed, the power is interrupted or the wash mode parameters are changed. The user programs the required number of wash cycles. The system automatically eliminates the “agitate” step from a single, or, the final wash cycle so that the clean pellet is well defined at the completion of the run.

Each wash cycle consists of four steps (Refer to Figure 3-1):

1 . FILL-Low Speed

Saline wash solution is drawn from the reservoir by the peristaltic pump up through the flow control valve, the flow switch and the cover saline dispensing nozzle. The nozzle feeds the saline into the inlet porthole in the rotor distributor. There the filler tubes feed the saline into the test tubes in a directed stream for maximum resuspension of cells.

2. SPIN-High Speed

The system rapidly accelerates to full speed to pellet the red blood cells. Automatic dynamic braking at the end of this step provides rapid deceleration to prevent resuspension or dislodging of the cell button.

3. DECANT-Low Speed

The rotor holds the tubes at a slight negative angle and spent saline is expelled from the test tubes by low centrifugal force. This action retains virtually all cells in the tubes while effectively removing almost all residual saline. Decanted waste solution is directed, by the splash guard in the cover, into the drain-hole in the chamber (guard bowl) and into the drain tubing which carries the waste out of the cell washer and into a waste container or drain.

4. AGITATE (except in a single or final wash cycle)

This phase is included on all but the final, or a single, wash cycle. By a rapid “stepping" motion of the rotor, cell pellets are disrupted (broken up) for resuspension of the cells during subsequent wash cycles. If desired, the agitation sequence may be manually added at the end of the run.

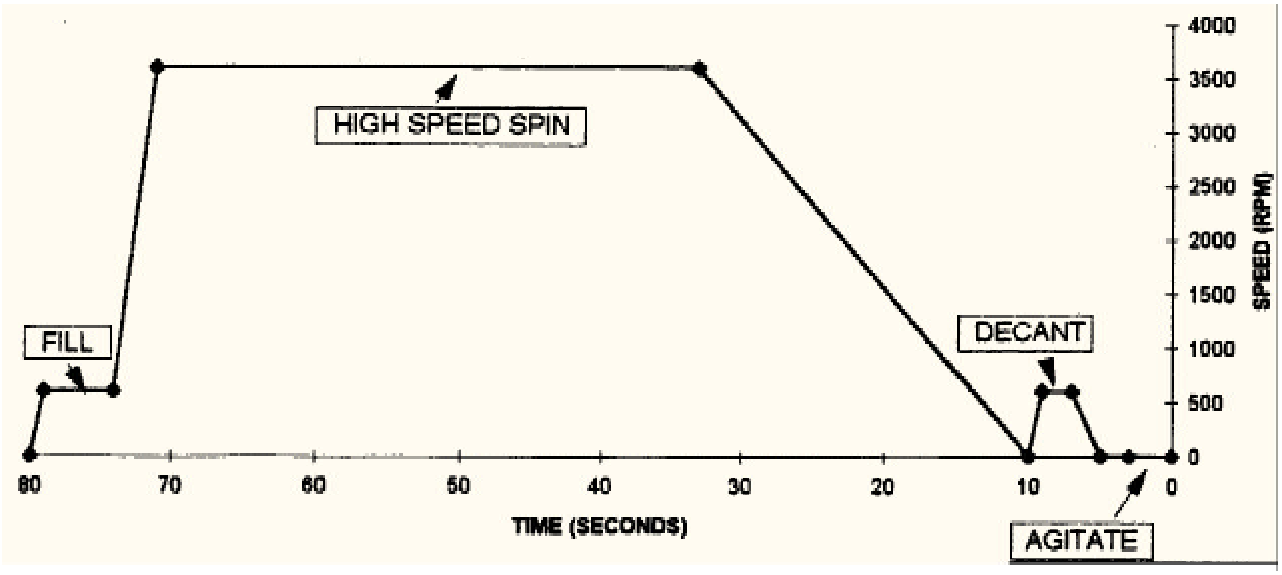


Figure 3-1 Centra-W Wash Cycle

3.3 Operational Precautions

To guarantee accurate test results, the proper use of the cell washer as described herein and in the testing procedure provided by the reagent manufacturers must be followed explicitly. Also, be sure that test materials are used within the manufacturers recommended dates.

Erroneous antiglobulin readings can result from any of the following:

- The sample serum/cell ratio is improper.
- The red cells were not sufficiently washed.
- The saline solution was improperly decanted.
- The volume calibration has shifted due to change in the saline level or restriction in the feed tube.
- The antiglobulin serum is inactive or outdated.
- The antiglobulin serum was not added to a tube(s).
- The final centrifugation (spin) was improper.
- The reading or recording of results is inaccurate.

This cell washer provides accurate washing, decanting, and a proper speed for the final spin. However, the cell washer and the procedures outlined herein will not eliminate all potential errors. To minimize errors, proper laboratory procedures require adequate control of all tests performed.

WARNING: When handling and disposing of blood and blood components follow standard laboratory procedures. Observe all safety precautions and standard laboratory practices.

3.4 Saline Solution - Priming and Volume Calibration

WARNING: Some saline solution contains a sodium azide preservative which may react with the drain plumbing to form dangerous explosive azide salts. Check with the saline solution supplier before discharging waste solutions directly into normal drains.

Long-term exposure to certain preservatives found in azide-free saline solutions may adversely effect certain plastic components within the cell washer. Routine housekeeping and cleaning practices will help to remove salt deposits in, and prolong the life of, these components.

Priming

Priming is required whenever a new saline supply is connected.
To prime the instrument:

1. Connect the saline reservoir to the cube adapter of the pump tubing.

2. Open the cover and place a receptacle under the saline dispenser nozzle in the cover.

NOTE: When priming or calibrating the pump with the cover open always put a container in front of the nozzle before pressing the calibrate key. (Otherwise, you will get wet!)

3. Press the CALIBRATE key. Saline will enter the lines. If saline does not reach the receptacle, press the CALIBRATE key again until the lines are full of saline solution and free of air bubbles.

Volume Calibration

This procedure provides the correct volume of saline solution to be distributed to each test tube.

Calibration is required daily. Calibration is also required if the saline reservoir has been replaced or pump tubing replaced.

1. Push the Power Switch to the on position.

2. The OPEN COVER LED lights.

3. Press the OPEN COVER key.

4. The cover will open.

5. Hold a 100 ml graduated cylinder directly under the saline dispenser in the cover.

NOTE: When priming or calibrating the pump with the cover open always put a container in front of the nozzle before pressing the calibrate key. (Otherwise, you will get wet!)

6. Press the CALIBRATE key. A volume of saline will dispense into the cylinder. This volume should be:

VOLUME TOTAL	TUBE SIZE
54 ml	**12 x 75 mm tubes**
40 ml	**10 x 75 mm tubes**

If volume is not correct, turn the flow valve on the saline supply tubing clockwise (CW) to decrease volume flow and counter clockwise (CCW) to increase volume flow. Recheck by following this procedure starting at step 5. Repeat this procedure as necessary.

The cell washer must be Calibrated for a 12 tube load even though fewer tubes may be used.

3.5 Wash Mode

Wash Cycle

The wash mode can consist of 1, 2, 3 or 4 wash cycles. To perform an automatic wash:

Push the POWER SWITCH to the ON position. The TIME and the CYCLE displays will show zeroes. The STOP LED and OPEN COVER LED will light. Press the OPEN COVER key and raise the cover. Install the solenoid plunger onto the drive assembly shaft. Turn the solenoid plunger counterclockwise (CCW) until the slot in its underside completely engages the pin in the drive assembly shaft. The solenoid plunger is correctly seated when it cannot be turned independently of the motor shaft. Carefully install and seat the rotor onto the drive assembly shaft. Turn the rotor counterclockwise (CCW) until it rests on the drive assembly shaft and engages the slot at the top of the drive assembly shaft. The rotor is properly seated when it cannot be turned independently of the solenoid plunger. Install tubes symmetrically in the rotor.

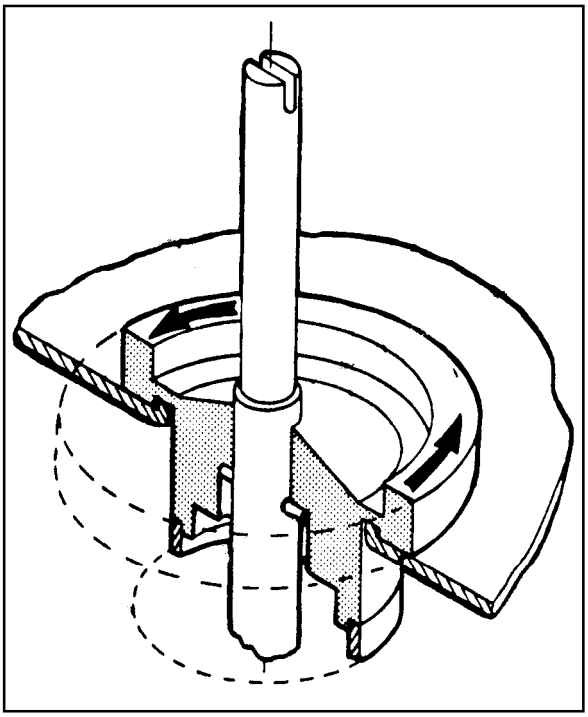


Figure 3-2 Rotor And Plunger Installation

CAUTION: The rotor must be run with a balanced load or damage to the rotor and instrument can occur.

Close the cover and press the WASH key. Press the appropriate number key 1, 2, 3 or 4 for the desired wash cycle(s). The selected cycle number will appear on the CYCLE display. Also, the TIME display will show 80,160, 240 or 320 seconds for the respective 1, 2, 3 or 4 wash cycles. Press the RUN key. The RUN LED will light, and the TIME display will show the run time remaining.

You may stop the run by pressing the STOP key for immediate braking or pressing the CHECK key to pause after the current step (Fill, Spin, Decant or Agitate). If the STOP key was used, then the wash cycle will start from the beginning when restarted.

NOTE: If saline flow is interrupted or depleted, the run stops, an alarm sounds and the ADD SALINE LED lights. (See Section 3.4)

The CHECK key is operable only in the WASH mode. Pressing the CHECK key stops the run between two steps. The run will continue from there when the cover is closed and the RUN key is pressed.

At the end of the run the OPEN COVER LED will light, and an alarm will sound. Press the OPEN COVER key and raise the cover.

3.6 Spin Mode

In this mode the cell washer can be operated at high speed as a centrifuge in a timed run or in an untimed (HOLD) run.

Timed

Press the SPIN key and enter the desired centrifugation run time from I through 999 seconds. The selected time will appear on the TIME display. Press the RUN key. In the timed mode the rotor will accelerate to, and spin at, high speed for the designated time. The remaining time to spin will be displayed continuously in the TIME display and then the unit will shut off automatically.

NOTE: If agitation is desired prior to spin: press the SPIN Key; press the AGITATE key, then press the appropriate run time keys. Now the instrument is programmed for a six-second agitation prior to centrifugation.

Untimed (Hold)

Press the SPIN key and then press the HOLD key. Press the RUN key. The rotor will accelerate to, and spin at, high speed until the STOP key is pressed.

3.7 Agitate Mode

NOTE: Agitation can be performed with the cover open or closed. Press the AGITATE key to obtain a six-second agitation. An agitate can be added to the spin cycle by pressing the SPIN and AGITATE keys.

3.8 Operating Procedure

1. Press the POWER switch to the ON position (The STOP LED and the OPEN COVER LED will light and the TIME and CYCLE displays will show zeroes).

2. Press the OPEN COVER key and raise the cover.

3. Install the tubes symmetrically in the rotor.

CAUTION: The rotor must be run with a balanced load or damage to the rotor and instrument can occur.

4. Close the cover.

5. Press the WASH Key.

6. Press the desired number of washes (1-4).

7. Press the RUN Key to initiate the wash cycle.

8. The STOP LED, and the OPEN COVER LED will light when the wash cycle(s) is complete. Press the OPEN COVER key and raise the cover.

9. Add the appropriate amount of anti-human serum to the tubes.

10. Close the cover. Press the SPIN key and, if desired, the AGITATE key. (If AGITATE key is pressed the tubes will be agitated for six-seconds and then spun).

11. ENTER the number of seconds for the desired cycle time.

12. Press the RUN key to begin the spin cycle.

13. At the end of the entered time the STOP LED and the OPEN COVER LED will light. When the spin cycle(s) is complete; press the OPEN COVER key and raise the cover. Remove the tubes and read the results.

14. Add lgG-sensitized control cells to all negative reactions and replace the tubes in the rotor. Be sure the load is symmetrically balanced.

15. Repeat steps 12 and 13.

NOTE: Once the preceding programmed wash and spin cycles have been entered, they remain in the memory unless the CLEAR key is pressed, the Power Switch is pushed, the wash mode parameters are changed or the power is interrupted. Therefore, simply press the WASH key or SPIN key. Then press the RUN key. The run cycle will include all the previously entered number of wash cycles or spin time, and agitate, if programmed.

3.9 Anti-Human Globulin

The following Anti-Human Globulin Test protocol can be used as a check of proper cell washer operation.

Perform the operational tests with a full rotor of twelve (12) either the 10 mm x 75 mm tubes or the 12 m x 75 mm tubes as described below:

1. Add up to six (6) drops of AB serum and one (1) drop of a 2-5% red cell suspension in each tube.

2. Run the tubes through three (3) wash cycles with tubes at least 80% filled [approximately 40 ml total for twelve (12)10 x 75 mm tubes and 54 ml total for twelve 12 x 75 mm tubes for each wash].

3. Add two (2) drops of anti-human serum to each tube.

4. Agitate tubes and spin for 15-20 seconds. Examine for agglutination. All tubes should give negative reactions.

5. Add one (1) drop of Coombs control cells to each negative tube.

6. Agitate tubes and spin for 15 seconds. Examine for agglutination. All tubes should give positive reactions.

4 MAINTENANCE

4.1 Preventive Maintenance

Daily

1. Inspect tubing and connections.

Make sure all tubing is securely connected and free from obstructions. Make certain that drain tubing is not restricted and that saline waste can flow through freely by gravity.

2. Inspect interior bowl (Remove guard bowl).

Make certain that the bowl is clean and free of dried saline crystals and other debris. It is important to wipe out the bowl daily with a damp sponge or cloth.

3. Check saline fill volume.

Using the CALIBRATE key and a graduated cylinder, make certain the unit delivers 40 mL of saline if using 10 x 75 mm tubes or 54 mL if using 12 x 75 mm tubes. It the volume delivered is below the required amount adjust the saline flow valve (clockwise to decrease the amount of saline and counterclockwise to increase the flow).

Weekly

1 . Flush tubing with a 1:10 solution of household bleach (0.5% Sodium Hypochlorite).

Prepare enough diluted bleach to run through four wash cycles (approximately 200 ml). Remove the saline supply tube from the saline reservoir. Press the CALIBRATE key until all saline is pumped out of the line. Connect the saline supply line to the bleach solution and program the unit to Wash 4 (four) times. Remove the saline supply line from the bleach solution and again empty the line by pressing the CALIBRATE key. Then connect the saline supply tubing to at least one liter of distilled water and fill the line by pressing the CALIBRATE key. Run the unit through enough Wash cycles to use all of the distilled water. Again clear the line using the CALIBRATE key.

Reconnect the saline supply line to the saline reservoir and prime the unit using the CALIBRATE key. Make certain that the inner bowl is wiped out to remove any excess moisture before resuming use of the cell washer.
2. Clean the rotor and solenoid plunger.

Remove the solenoid plunger and wash with plenty of warm water and a mild detergent (paying particular attention to the inside of the plunger and the metal band). Rinse thoroughly under warm water. Take a damp cloth and wipe any saline residue from the well that the plunger sits in. Replace the solenoid plunger.

Remove rotor from the unit and wash with warm water and a mild detergent. Direct running water into the hole in the top of the rotor for several minutes and make sure water is flowing freely out of all filler tubes. Direct water into the slot of each tube holder. Install and spin the rotor in the cell washer for approximately 20 seconds to remove excess water.

Three Months

1. Check motor speed.

Set the power switch to ON. Press the HOLD key. Allow the motor to accelerate to speed. Shine a stroboscope or tachometer through the viewport in the cover to verify the speed as indicated below. If the motor is not spinning at the correct speed, you should notify your Service Representative. Press the STOP key. Set the power switch to OFF. Replace the solenoid plunger and rotor.

Power Frequency	RPM
50 Hz	2800-3000
60 Hz	3400-3600

2. Check spin time.

Press the SPIN key and enter the length of spin time. Press RUN. As soon as the spin cycle starts (start of spin can be determined by listening for hum), start the stopwatch. Stop the stopwatch when the time display reads 000. Verify that spin time is correct.

4.2 Replacement Parts

The following parts may be replaced by the user.

Guard Bowl Cat. No. 50402.
Pump Head Tubing Kit Cat. No. 50019.
Valve Cat. No. 65450.
Fuse -100/120 VAC, 5A, 5 x 20 mm Cat. No. 49946.
Fuse - 220/230/240 VAC, 2.5A, 5 x 20 mm Cat. No. 49937.
Solenoid Plunger Cat. No. 44919.
Rotor Cat. No. 477.
Cover Splash Guard Cat. No. 50247

4.3 Guard Bowl Removal

Set the POWER switch to the ON position and open the cover. Set the POWER switch to the OFF position. Unplug the power cord. Remove the rotor and solenoid plunger. Wipe the inside of the guard bowl completely dry. Pull up the three white guard bowl retainers approximately 1/4 inch. Carefully lift the guard bowl out of the cabinet. Do not allow saline solution on the guard bowl drain to drip into the motor shaft area. Examine the interior and exterior surfaces of the guard bowl for cracks or holes. If damaged, or if the surfaces are sticky to the touch, replace it with a new one. Otherwise, wash it with warm water and mild detergent.

To replace it, place the guard bowl in the cabinet opening; orient the guard bowl so that the drain faces the rear of the unit and fits into the drain hole of the inner splash guard. Push all three white retainers down flush with the guard bowl. Replace the solenoid plunger; turn it counterclockwise (CCW) until it is properly seated. Replace the rotor; turn it counterclockwise (CCW) until it is properly seated.

4.4 Pump Tubing Replacement

Refer to Figure 4-1 when replacing pump tubing.

1. Unplug line cord from power source.

2. At the rear of the unit, remove the two thumbscrews that hold the pump head in place. Pull out the front half of the pump head and the roller assembly to free up the tubing.

3. Disconnect the tubing attached to the bottom of the flow sensor, and remove the tubing from the saline supply. Discard the entire tubing set.

4. Attach the new tubing set (already assembled) by connecting the silicone tubing end to the flow sensor (short tubing end). Be sure that it is pushed all the way up.

5. Insert the pump rollers into the pump head (long end of shaft outward). Turn the pump shaft by hand to verify that the pump motor is coupled.

6. Wrap the C-Flex tubing portion (between two elbows) around the rollers with the elbows toward the left side. The pump inlet (long tubing) should be placed in the bottom channel.

7. With one hand, place both ends of the pump tubing into the channels and gently pull the ends (stretching the tubing). With the other hand, attach the pump head front half over the back half (pump halves should be flush against each other). Insert the thumbscrews and fasten them. Take care to avoid pinching the tubing (turning the pump shaft during alignment/fastening may help).

CAUTION: Do not use a sharp object to fit the tubing in place as this may damage the tubing.

8. Gently pull on the drain tubing (to unkink it), and slide its clamp up the tubing as close to the cabinet assembly as possible. Tighten it in place to prevent kinking.

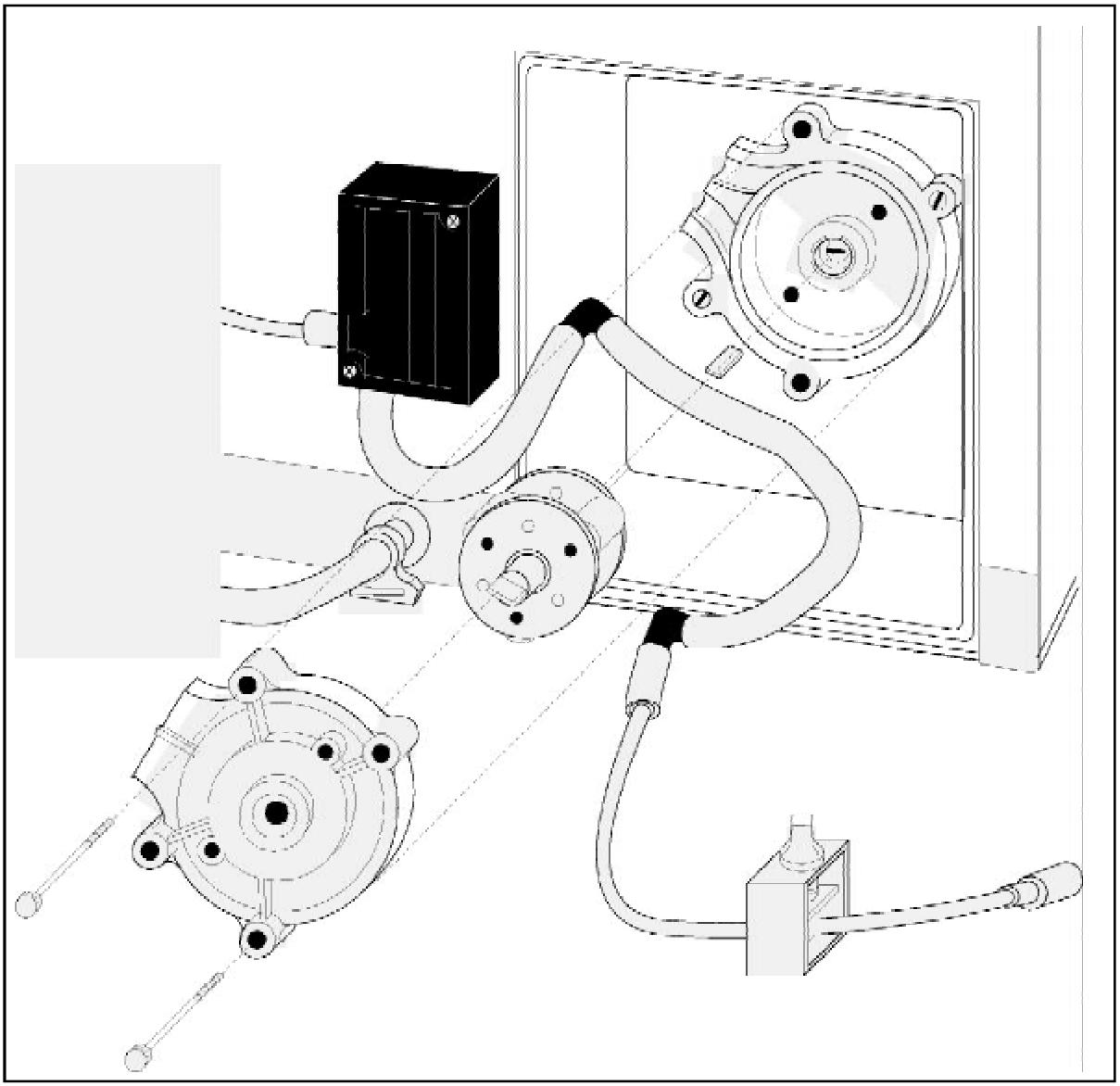


Figure 4-1 Pump Assembly

9. Visually inspect all tubing to ensure that none is kinked. Turn the pump shaft by hand to ensure proper operation. Connect the cube adapter to saline cube nozzle (or insert entire tube end into any saline container). Slide the flow valve to a convenient location along the inlet tubing. Plug the line cord back in, and calibrate.

CAUTION: Failure to ensure this proper seating before operating the pump, may result in damage to the drive unit.

CAUTION: The silicone tubing supplied by IEC is especially manufactured for use in the peristaltic pump. Do not use any other tubing. Improper installation of peristaltic pump silicone tubing may significantly shorten its life. Failure to hold a slight tension of the pump tubing during installation may cause binding of the pump tube to the roller and possible damage to the pump.

4.5 Decontamination

WARNING: All materials of human origin should be handled as potentially infectious materials.

1. Always wear protective gloves when handling blood, blood components, or blood contaminated materials.

2. Clean blood spills according to your institution's recommended procedure for decontamination or that described in the latest revision of National Committee for Clinical Laboratory Standards (NCCLS) guidelines for the protection of laboratory workers from instrument biohazards.

3. Wipe instrument with a damp towel (water only) and thoroughly dry.

4.6 Cover Interlock Bypass

In the event of a power failure, the cover interlock has a mechanical bypass for sample retrieval. To bypass the interlock, turn the POWER swtch to the OFF position and unplug the cell washer. Locate the access hole in the upper right hand corner of the cell washer (remove the cover plug). Turn the POWER switch to the OFF position. Place an insulated rod approxmately 6 inches straight through the opening. Push gently to disengage the latch. Replace the cover plug and turn the POWER switch back to ON.

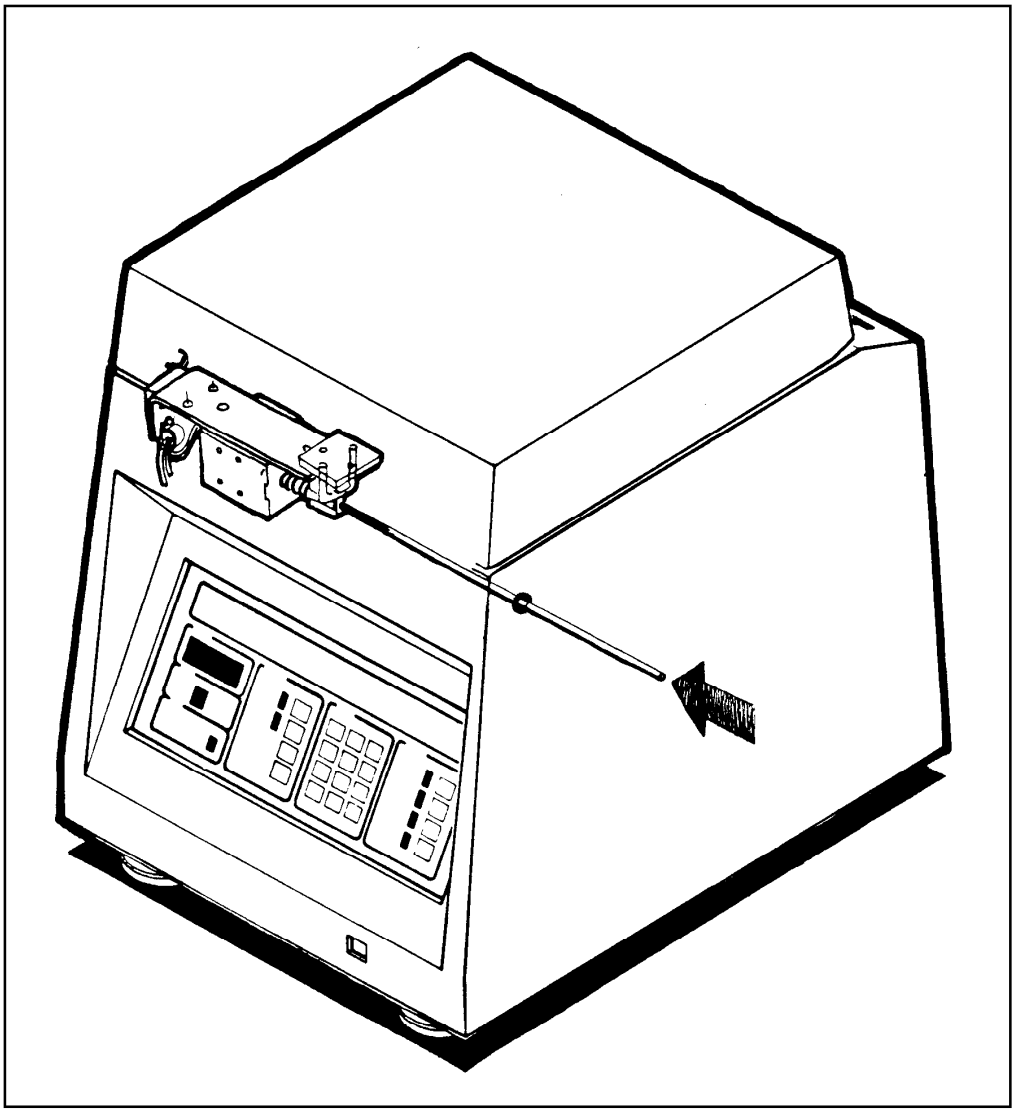


Figure 4-2 Cover Interlock Bypass

5 WARRANTY

IEC wants you to be satisfied with the quality of your CENTRA-W Cell Washer. We warranty your IEC cell washer and rotor for one year. We will repair or replace any of these products that fails, within this period from the date of its delivery, due to defects in material and workmanship, and we will ship you the repaired product or its replacement at our expense. You must use IEC approved accessories and genuine IEC spare parts. This warranty does not apply to any instrument that has been repaired without authorization or abused.

THE FOREGOING OBLIGATIONS ARE IN LIEU OF ALL OTHER OBLIGATIONS AND LIABILITIES INCLUDING NEGLIGENCE, AND ALL WARRANTIES, OF MERCHANTABILITY OR OTHERWISE, EXPRESSED OR IMPLIED IN FACT OR BY LAW. THE FOREGOING STATES OUR ENTIRE AND EXCLUSIVE LIABILITY, AND BUYER'S EXCLUSIVE REMEDY, FOR ANY CLAIMS OR DAMAGES IN CONNECTION WITH THE SALE OR FURNISHING OF GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION, OR OPERATION. IEC WILL IN NO EVENT BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND OUR LIABILITY UNDER NO CIRCUMSTANCES WILL EXCEED THE PURCHASE PRICE FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED.

5.1 Condition of Returned Equipment

Before returning equipment to IEC, you must contact IEC's or your dealer's service department and receive a return goods authorization (RGA). All returned units must be decontaminated, free of radioactivity, and free of hazardous and infectious materials. The RGA paperwork includes a certificate for you to sign indicating that you have performed these steps. IEC will not accept the shipment unless this signed certificate accompanies it.

You must prepay transportation to the service depot.

6 SPECIFICATIONS

ELECTRICAL	
Electrical Requirements	100, 120, 220, 230, or 240 VAC, +/- 10%,50/60 Hz
Motor Type	2 speed induction
Motor:	
High Speed Spin (50Hz)	2800-3000 rpm*
Spin (60Hz)	3400-3600 rpm*
Low Speed Decant (50Hz)	570-600 rpm*
Decant (60Hz)	690-720 rpm*
Length of Modes:	
Automatic	total cycle time 80 seconds
Manual	timed to 999 seconds, or indefinite in hold mode
TUBE TOLERANCES:	
Diameter	10 mm or 12 mm +/- 0.09 mm
Length	75 mm +/- 2 mm
CELL WASHER DIMENSIONS:	
Depth	16 3/8 inches (41.6 cm)
Width	12 5/8 inches (32.1 cm)
Height:	
Cover closed	15 3/16 inches (38.6 cm)
Cover open	25 inches (63.3 cm)
Mass (weight):	
Net	45 lbs. (20.4 kg)
PACKING CASE DIMENSIONS:	
Depth	17 1/4 inches (43.8 cm)
Width	20 1/8 inches (51.1 cm)
Height	28 inches (71.1 cm)
AMBIENT TEMPERATURE:	
Operation	10 °C to 35 °C
Storage	20 °C to 70 °C
RELATIVE HUMIDITY:	
Operation	20% to 90%
Non-Operation	5% to 95%
Storage	5% to 95%

***NO LOAD**

Specifications Subject To Change Without Notice

7 SERVICE

7.1 Warning And Cautions

Warnings: The following hazards exist in servicing the Centra-W Cell Washer:

The unit uses AC power, and some of the service procedures require operation with the cabinet off, exposing power lines. This introduces the risk of electrical shocks. Service should be performed by qualified personnel only. Do not touch exposed wires without first unplugging the unit.

Cautions: An additional hazard to the equipment is as follows:

The circuit board contains electronics that can be damaged by static electricity. Persons doing extensive maintenance on the circuit board, or removing individual components from the circuit board, should be grounded (such as by wearing a wrist strap). When shipping a circuit board, always enclose it in a static-protective bag.

7.2 General

Service on the IEC Centra-W Cell Washer can be performed with common tools. A multimeter is required to utilize the troubleshooting techniques in this manual.

This manual is intended as a guide for problem component identification and replacement. Once a component has been identified as defective, IEC recommends replacement.

Over the history of the IEC Centra-W Cell Washer there have been many improvements. This manual is specific to the current production version at the time of writing of this manual. Generally, the information contained in this service portion should be applicable. If you find that more specific information is required for your cell washer, contact IEC's Technical Service Dept. at (800) 843-1113.

7.3 Troubleshooting

SYMPTOM	REMEDY
No lights (plugged in & power switch on).	Check fuses (PEM & PC board).
No operation (lights on).	Check voltage configuration. Check for loose connections. Check cover/latch switch.
Motor won't turn (one or both speeds).	Check voltage configuration. Check motor.
No pump operation (not even CALIBRATE).	Check voltage configuration. Check pump.
No saline (pump operates).	Check tubing for leaks/restrictions. Check for proper tubing installation (Flow direction).
No decant (tubes full).	Clean rotor and plunger. Clean plunger well. Check plunger drive pin. Check rotor tubeholder tabs.
Abnormal decant (more than a drop of saline in tubes).	Check motor speeds. Clean plunger well.
Inconsistant fill.	Calibrate saline volume. Clean rotor. Check tubing. Check cover splash guard alignment.
Large amount of saline remains in guard bowl.	Check drain tubing for restrictions. Ensure drain tubing flows downward -drain receptacle below cell washer.
Cover won't open.	Check solenoid. Checck hinge tension.

8 CABINET

8.1 Cabinet Removal

Cabinet removal is required to gain access to the following components: latch assembly, drive assembly, control PCB, pump motor, and electrical components. **To remove the cabinet**, first, open the cover, remove the rotor and plunger, remove the guard bowl, and unplug the unit (do not close cover). Remove the four Phillips head screws at the rear of the cell washer, and the two on the front control panel. The cover and cabinet assembly slide forward and can be lifted up for removal. The wiring harness to the latch assembly and the tubing from the cover to the flow switch must both be disconnected before complete removal is possible (reach in between the cabinet and inner splash guard to gain access to the latch harness).

When installing the cabinet use the same method (only backwards) being careful so that when the cabinet is placed on the base, no wires are pinched between them.

8.2 Control Panel Removal

To remove the control panel, first, remove the cabinet (see Section 8.1). Disconnect the three wiring harness connectors to the PCB. Remove the four nuts (in corners) securing the control panel assembly. The entire assembly can now be removed from the base.

To separate the PCB from the control panel, disconnect the ribbon cable between the PCB and control panel. Remove the five nuts (one in each corner and one in center) securing the PCB to the control panel. Take care not to lose the standoffs when lifting the PCB off.

8.3 Latch Assembly

The latch assembly contains three parts; the latch striker (catch), solenoid

assembly, and magnetic actuator/switch. The catch is mounted to the cover and engages the solenoid assembly when the cover is closed. The magnetic actuator/switch senses the state of the cover (closed or open) in order to disable certain functions if the cover is not closed.

The catch can be accessed by opening the cover. Removal of the cabinet (see Section 8.1) is required to perform any service on the latch assembly. To remove the latch assembly, remove the three nuts securing it.

To test the latch switch, place your multimeter leads across the VIO and BLK wires in the harness (J7 pins 3 & 4 - see Wiring Diagram). When the cover is open, the circuit should read open, and when the cover is closed there should be some low resistance. If these readings aren't found the cover may need to be repositioned to line up the magnetic actuator in the cover. Alignment is adjusted at the cover hinges, where they mount to the cabinet. The screws that secure the hinges to their brackets can be loosened and retightened once alignment is achieved. If alignment is not successful, the actuator in the cover or the switch in the latch assembly may require replacement.

To test the solenoid, measure its resistance by placing meter leads across the ORN and GRY wires in the harness (J7 pins 1 & 2). The coil resistance should be approximately 125Ω. If it reads open, replace the interlock assembly.

To verify power to the solenoid, requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1 Warnings and Cautions)**. Place leads in the back of the connector shell going to the solenoid across the ORN and GRY wires (J7 pins 1 & 2). (The harness can be connected by placing the cabinet on its side with the control panel opening towards the base. Feed the harness through the control panel opening to reach the latch assembly for connection.) With the cover closed, press the cover open key and the solenoid should receive approximately 108 VDC for a few seconds. (Peak Hold may be necessary to see full 108.) If voltage is not present, and the LED on the PC board (labeled COV) indicates that it is activating the solenoid, check for a loose connection. If none is found, replace the PC board.

8.4 Hinges

There are two adjustable cover hinges on the Centra-W. To access them the cabinet must be removed (see Section 8.1). They are attached to mounting brackets which are secured to the cabinet. Hinge height can be adjusted by loosening the four (each) mounting screws, repositioning the hinge and securing it. Hinge tension is adjusted from beneath the hinge by turning the adjustment screw (clockwise to tighten). Take care to have the same tension in both hinges.

8.5 Cover Assembly

The cover assembly includes the cover, catch, cover splash guard assembly and viewport. The cover splash guard assembly includes the splash guard with viewport, metal feed tube and tubing. This assembly is held in place by three nylon screws.

To align the cover splash guard, place a piece of tape of the center hole in the top of the rotor. Close the cover (not completely) and notice where the feed tube has marked the tape. It should be in the center of the rotor hole. If it is not, it can cause fill level variations. Loosen the three nylon screws and position the cover to center the feed tube. If there is not enough range to accomplish this, the feed tube may be bent.

To replace the cover splash guard, remove the three nylon screws, disconnect the feed tubing at the back of the machine, and slide the tubing through the cover's opening. Align the new cover splash guard as mentioned previously.

8.6 Base Assembly Components

There are several components mounted to the base assembly. These include the power entry module, power switch, line filter, transformer, relay, diode, terminal board, mounting feet and capacitors (3).

These components may be accessed by removing the cabinet (see Section 8.1).

9 POWER

9.1 Power Circuit

Main power to the centrifuge is provided through the Power Entry Module (PEM), and then through the power switch. PEM configuration is described in Section 2.3. If configured improperly, the displays may look fine but some functions will not work. From the power switch, power is delivered through the line filter to the autotransformer. 120 VAC is then distributed to the PC board for operation.

9.2 Blowing Fuses

There is one internal fuse (see Section 10.3) on the PC Board, and two external fuses (see Section 2.3) in the Power Entry Module (PEM). A short circuit inside the unit, when power is applied to that component, will draw excessive current, blowing a fuse. Spare fuses are important to have on hand, as it may require expenditure of good fuses to isolate the problem.

A general location of the short circuit may be made by observing when the fuse blows:

- If a fuse blows **immediately** when the unit is powered on, the short may be in the main power circuit, (power entry module, power switch, autotransformer, or line filter) or in the circuit board.

- If a fuse blows when the **COVER OPEN button is pressed**, the short may be in the latch assembly.

To further localize the short, components may be selectively disconnected, and the unit restarted. The following procedure requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1 Warnings and Cautions)**.
To do so:

First unplug the unit, and remove the cabinet (see Section 8.1). Look for loose materials, or bare wires. Gently tilt the unit to one side, and then to the other in order to locate any loose objects. Remove any loose objects, and repair or replace any bare wires.

The circuit board has 4 interface connectors, labelled J1 through J4. Connector J3 brings power to the circuit board. The other connectors distribute power and signals as follows:

J1 Membrane Control Panel
J2 Saline & Cover Switches
J4 Power Out

Detach connector J3 from the board and power the unit on. If a fuse blows, the short circuit is in the power entry module, autotransformer, power switch, or line filter. Unplug the unit and locate the failed component using an ohmmeter.

If a fuse was not blown, power the unit off, replace connector J3, and disconnect the other connectors (J1, J2, and J4). Power the unit back on and if a fuse blows, replace the circuit board.

Otherwise, power the unit off and reconnect one of the connectors, J1 through J4. Power the unit back on. If a fuse does not blow, reconnect connectors, one at a time, in the above manner until a fuse blows. Search for the short in the last component connected before the fuse blew.

10 CIRCUIT BOARD

10.1 General

The circuit board contains the following devices:

- o A microprocessor that senses the control panel input, and activates the various devices in accordance with its programming.
- o An EPROM (Erasable, Programmable Read-Only Memory) containing the programming. In special situations, the factory may issue a revised EPROM in order to change the unit's operation.
- o Solid state relays which activate various components in the unit.

IEC Service does not troubleshoot boards to component level. Schematics and parts lists of the boards are included in this manual. (see Section 13) Once a board has been determined to be faulty, replacement is recommended.

10.2 LEDs

The circuit board has several LEDs (Light Emitting Diode) on it. They are all labeled, and can be useful in troubleshooting. When an LED is lit, it means that the microprocessor has activated that particular device. If an LED is lit and the device is not functioning, check for power from the board to the device. If power is present, then the component should be replaced. If the device is functioning, and the LED is not lit, then the board should be replaced. LED indicators are present for the following devices:

Motor - High Speed	HiR
Motor - Low Speed	LoR
Pump	PMP
Relay	RLR
Decant Solenoid	DEC
Cover Solenoid	COV

10.3 Fuse

There is one fuses on the circuit board, labeled F1, to protect the logic circuitry. A blown F1 fuse will result in no display. Test the fuse with a meter to determine if replacement is necessary. The fuse is rated as follows:

F1 6.3 A, 125 V 5x20mm Slo-Blo IEC Part No. 8976

10.4 Test Points

The board contains 3 test points. They are as follows:

TP1	GND	Ground
TP2	+5V	Logic Voltage
TP3	10 Hz	Frequency

11 DRIVE ASSEMBLY

11.1 General

The motor in the Centra-W Cell Washer is a two speed brushless induction motor with sealed, permanently lubricated bearings. The drive assembly has added sealing at the factory to prevent saline from reaching the motor. If motor replacement is necessary, IEC recommends replacement of the *drive assembly.* The drive assembly includes the motor, motor mounting plate, coil mounting plate and solenoid coil (everything below the inner splash guard). This is available assembled, ensuring that proper sealing has been added.

The Centra-W Cell Washer does not require calibration. IEC recommends verifying the speed of the motor every three months (see Section 4.1 Preventive Maintenance).

11.2 Motor

Test

With the unit unplugged, there are electrical characteristics of the motor that can be checked. Remove the cabinet (see Section 8.1). Remove connector J5 at the motor. Measure the resistance of the motor between the following pins:

1 & 2	(BLU & YEL)	35Ω ± 5Ω
1 & 3	(BLU & RED)	75Ω ± 5Ω
2 & 5	(YEL & BLK)	100Ω ± 10Ω
3 & 4	(RED & BRN)	135Ω ± 10Ω
4 & 5	(BRN & BLK)	200Ω ± 10Ω

If any are found outside these ranges, replace the motor.

To verify power is being applied to the motor, use the following procedure. It requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1, Warning and Cautions)**. Use a voltmeter to measure the AC voltage to the high and low speed windings of the motor. At connector J4 (labeled POWER OUT) of the PCB, place a multimeter probe in the back of the connector shell at pin 6 (WHT) and pin 2 (BLK). Plug the unit in and verify that a properly loaded rotor is installed. Select one WASH cycle, and press the START key. 120 VAC should be present for the first step (FILL) of the wash cycle (approximately six seconds). Turn power off and change the probes to connector pins 6 (WHT) and 1 (BLU). Turn the unit back on, select one WASH cycle and press the START key. 120 VAC should be present for the second step (SPIN) of the wash cycle (after approximately six seconds). If voltage is present, and the motor does not run, check the motor. If voltage is not present, replace the board.

Replacement

To replace the motor, remove the cabinet (see Section 8.1)

Locate and remove the 3 screws that secure the inner splash guard. Remove the splash guard (note: RTV sealant is used to seal this inner splash guard to the drive assembly). Locate and disconnect the 6 pin motor harness connector (J5). Disconnect the motor ground lead. Loosen and remove the three large mounting bolts that secure the motor to the large rubber mounts. The drive assembly can now be removed.

Replace the drive assembly in the same fashion, reversing the steps (see Section 13 exploded view). Be sure to re-seal the inner splash guard to the drive assembly.

11.3 Brake

The brake in the Centra-W Cell Washer is an electric brake. The PC board, first, powers the low speed winding to bring the speed down and then applies a DC voltage to the high speed winding to stop the motor. The brake is used after the third (DECANT) step of each WASH cycle and during the agitate step. It is also used in the SPIN MODE at the end of a spin, and any time the STOP key is pressed.

To verify power is being applied to the motor for braking, use the following procedure. It requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1, Warnings and Cautions)**. Use a voltmeter to measure the DC voltage to the high speed winding of the motor. At connector J4 (labeled POWER OUT) of the PCB, place a multimeter probe in the back of the connector shell at pin 6 (WHT) and pin 1 (BLU). Plug the unit in and verify that a properly loaded rotor is installed. Select a SPIN of five seconds, and press the START key. At the end of the spin, approximately 26 VDC should be present. If voltage is not present replace the PC board.

11.4 Decant Solenoid

The decant function of the Centra-W Cell Washer involves three elements. The rotor, solenoid plunger and solenoid coil. The solenoid plunger (located beneath the rotor) has a metal band on it which, when the solenoid coil is energized, is pushed upward, locking the bottom tabs of the tube holders at a negative angle. Then, when the rotor is spun at low speed, the saline is forced up the sides of the tubes and out.

There are several factors which can prevent proper decanting, for example: saline build up in the solenoid plunger well, loose drive shaft pin, corroded or dirty solenoid plunger, broken tubeholder tabs on rotor, defective solenoid coil or PC board, etc..

The decant solenoid has electrical characteristics that can be checked with the unit unplugged. First, remove the cabinet (see Section 8.1) and disconnect the solenoid coil connector (J8). Measure the resistance across the two leads. It should be 645Ω ± 15Ω. If it is outside this range or reads open, replace the coil.

Note: The resistance may vary on cell washers below the serial no.s 23920499 & 24970094. Refer to Section 11.6.

To verify power is being applied to the coil, use the following procedure. It requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1, Warnings and Cautions)**. Use a voltmeter to measure the DC voltage to the coil at connector J8. Place probes in the back of the connector shell. Plug the unit in and verify that a properly loaded rotor is installed. Select one WASH cycle, and press the START key. Approximately 147 VAC should be present for the third step (DECANT) of the wash cycle. If power is not present, replace the PC board. If power is present, but decanting still does not occur, check the other possible causes listed earlier in this section.

To replace the solenoid coil, remove the cabinet (see Section 8.1) and inner splash guard (see Motor Replacement). Disconnect the connector (J8) to the solenoid coil.

Note: Be sure to take note of how the coil is sealed to the drive assembly. When replacing the coil it is important to reseal the assembly using RTV.

Remove the three screws holding the coil mounting plate to the motor. Turn the coil mounting plate upside down and remove the three screws holding the coil to the mounting plate. Remove the wiring connector and pull the coil out of the mounting plate. Place the new coil leads through the mounting plate and secure the new coil to the plate using the three screws. Re-attach the connector to the new coil leads. Place the entire assembly on the drive and secure with the three screws. Be sure to seal the assembly as it was prior to disassembly.

11.5 Rotor Repair

The 477 rotor is made of durable plastic. If a tubeholder or pivot break, they can be replaced using the following procedure:

1. Remove rotor from cell washer, remove any tubes and place the rotor upside down on a level workspace.

2. Remove the metal retaining ring that holds the stand (shown #2) in place and remove the stand.

3. Remove the second retaining ring (shown #15), and remove the three socket head screws (shown #13) using a 7/64" Allen wrench.

4. Lift the metal deck (shown #4) off of the assembly.

5. Gently lift the shaft (shown #3) off of the filler head (shown #5,6,7) assembly. Each tubeholder has 2 dowel pins (1 horizontal & 1 vertical - shown #10) which can slide out easily. Shake or tap until all vertical dowel pins and tubeholders have dislodged from the pivot ring (shown #5).

6. Separate the tubeholders (part no. 44924, shown #1) and pivots (part no. 44921, shown #16) by removing the horizontal dowel pins. Clean all dowel pins.

7. Place new tubeholders in new pivots as shown (tallest portion of pivot upward) and assemble with dowel pins.

8. Place shaft back on the filler head assembly lining up the three bolt holes.

9. Place the new tubeholder/pivot assemblies on the pivot ring and secure with dowel pins.

10. Install the metal deck as shown using the three socket head screws.

11. Replace the retaining ring in the lower groove of the shaft.

12. Place the stand on the shaft as shown and replace the last retaining ring in the groove of the shaft.

13. Place rotor right side up & verify that all tubeholders swing out fully as shown.

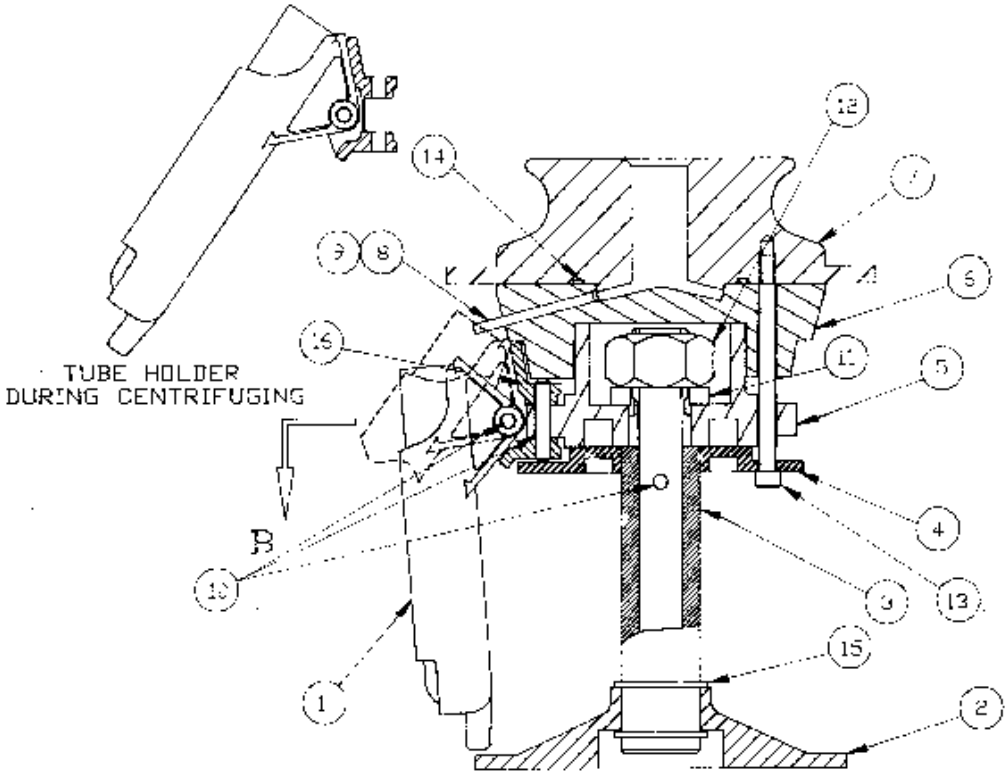


Figure 11-1 Rotor Assembly
(see Section 13 for parts identification)

11.6 Rotor Dependent Parts

The original Centra-W metal rotor (Cat. No. 49339 or 476) and its plunger (IEC Part No. 49774) have been replaced with a new plastic rotor (Cat. No. 477) and plunger. The new rotor is autoclavable and provides more consistent decant results. Certain parts must be ordered to match the rotor in use. The two systems *are not interchangeable*.

The removable guard bowl should be ordered to match the rotor used in the cell washer. When using the original black (metal) rotor, order part no. 49776. When using the new white (plastic) rotor order part no. 50402. The plunger must also match the rotor. When using the original black (metal) rotor, order part no. 49774. When using the new white (plastic) rotor order part no. 44919.

Original style cell washers require some modification to accept the new rotor system. Any cell washers below the following serial numbers require replacement of the solenoid coil. The original coil is not strong enough to lift the new style plunger.

23920499
24970094

Cell washers with higher serial numbers can be modified in the field. In addition to the new rotor (IEC Part No. 477), a new guard bowl (IEC Part No. 50402) and solenoid plunger (IEC Part No. 44919) must be installed.

12 PUMP

12.1 General

The peristaltic saline pump system in the Centra-W Cell Washer consists of three parts: the pump motor, pump head and pump tubing. Replacement of the pump tubing is described in Section 4.4.

12.2 Pump Motor

With the unit unplugged, there are electrical characteristics of the pump motor that can be checked. Remove the cabinet (see Section 8.1). Remove connector J9 at the pump motor. Measure the resistance of the pump motor between the following pins:

2 & 3 (WHT & RED) approximately 4Ω

If it shows open, replace the pump motor.

To verify power is being applied to the pump motor, use the following procedure. It requires operation of the unit with power applied and the cabinet removed (see Section 8.1). **Use caution to avoid electric shock (see Section 7.1, Cautions)**. Use a voltmeter to measure the AC voltage to the pump motor. At connector J9 place probes in the back of the connector shell at pins 2 & 3 (WHT & RED). Plug the unit in and verify that a properly loaded rotor is installed. Select one WASH cycle, and press the START key. 120 VAC should be present for the first step (FILL) of the wash cycle (approximately six seconds). If voltage is not present, check for loose connections and/or replace the PC board. If voltage is present and the pump motor is not functioning, replace the pump motor.

To replace the pump motor, remove the cabinet (see Section 8.1). Remove both thumbscrews that secure the front half of the pump head in place and remove it, the tubing, rollers and the coupler. Remove the two screws that hold the back half of the pump head in place and remove the pump head. Remove the splash guard and the four screws that secure the pump motor to the bracket. Disconnect the ground lead to the pump motor and its wiring harness connector. Install a new pump motor in the same fashion.

12.3 Flow Switch

The flow switch is used to sense when the saline supply has been depleted. The switch is normally open (saline present). When saline is not present the switch closes and stops a run during the fill mode.

To replace the switch, remove the cabinet (see Section 8.1), disconnect the wiring harness to the switch and remove its two mounting screws.

13 DRAWINGS

Drawing No.	Description
Figure 13-1	Base Assembly
Figure 13-2	Drive Assembly
Figure 13-3	Pump Assembly
Figure 13-4	Rotor Assembly
10853	Wiring Diagram/Schematic
10852	PC Board Schematic (2 pages)
44443	PC Board Layout
PL-44443	PC Board Parts List

Note: At the time of publication these drawings and diagrams were accurate. Changes to the units do occur. If you have any questions regarding these drawings and diagrams, please contact IEC Technical Support at (800) 843-1113.

Figure 13-1 Base Assembly

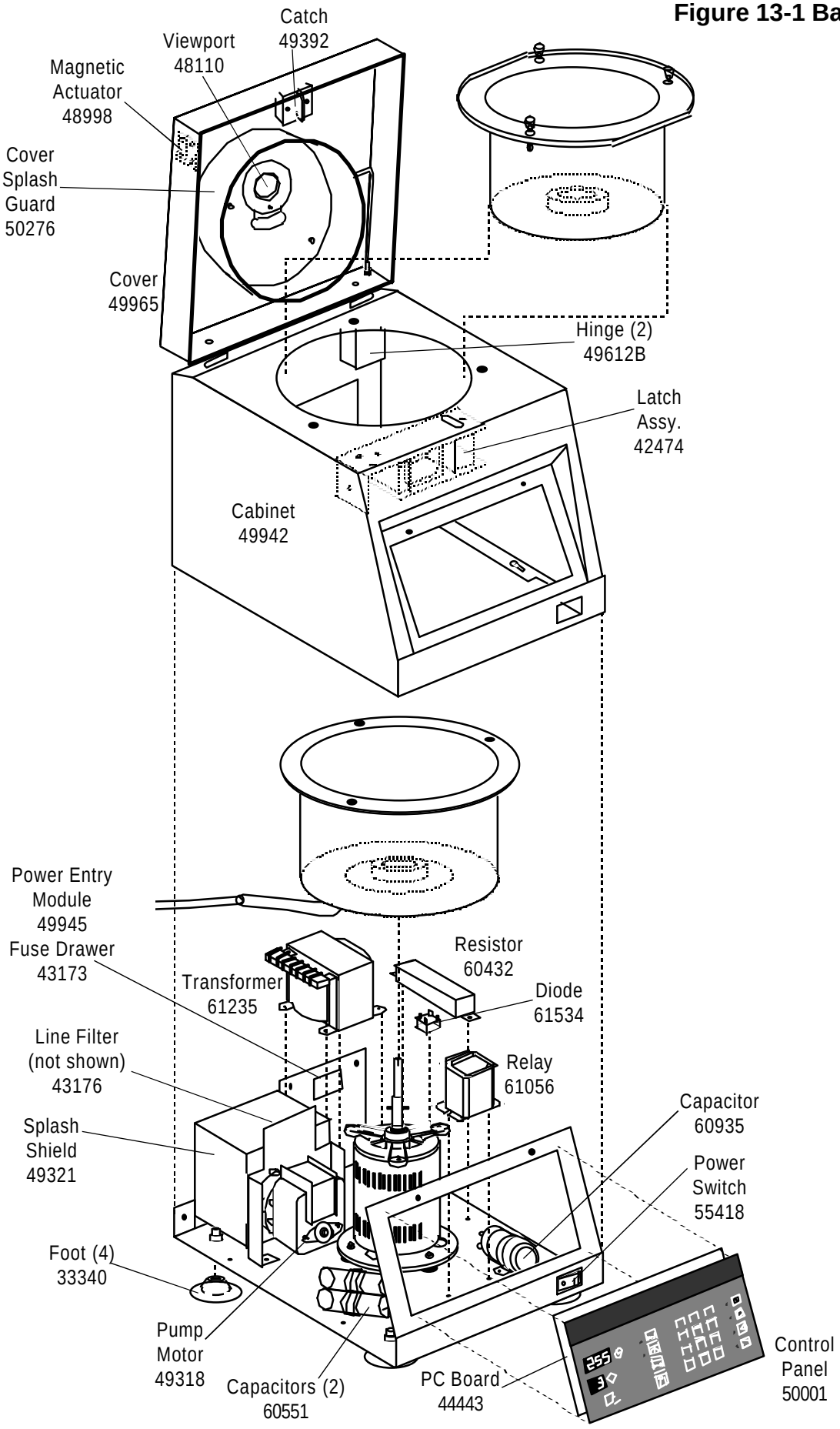
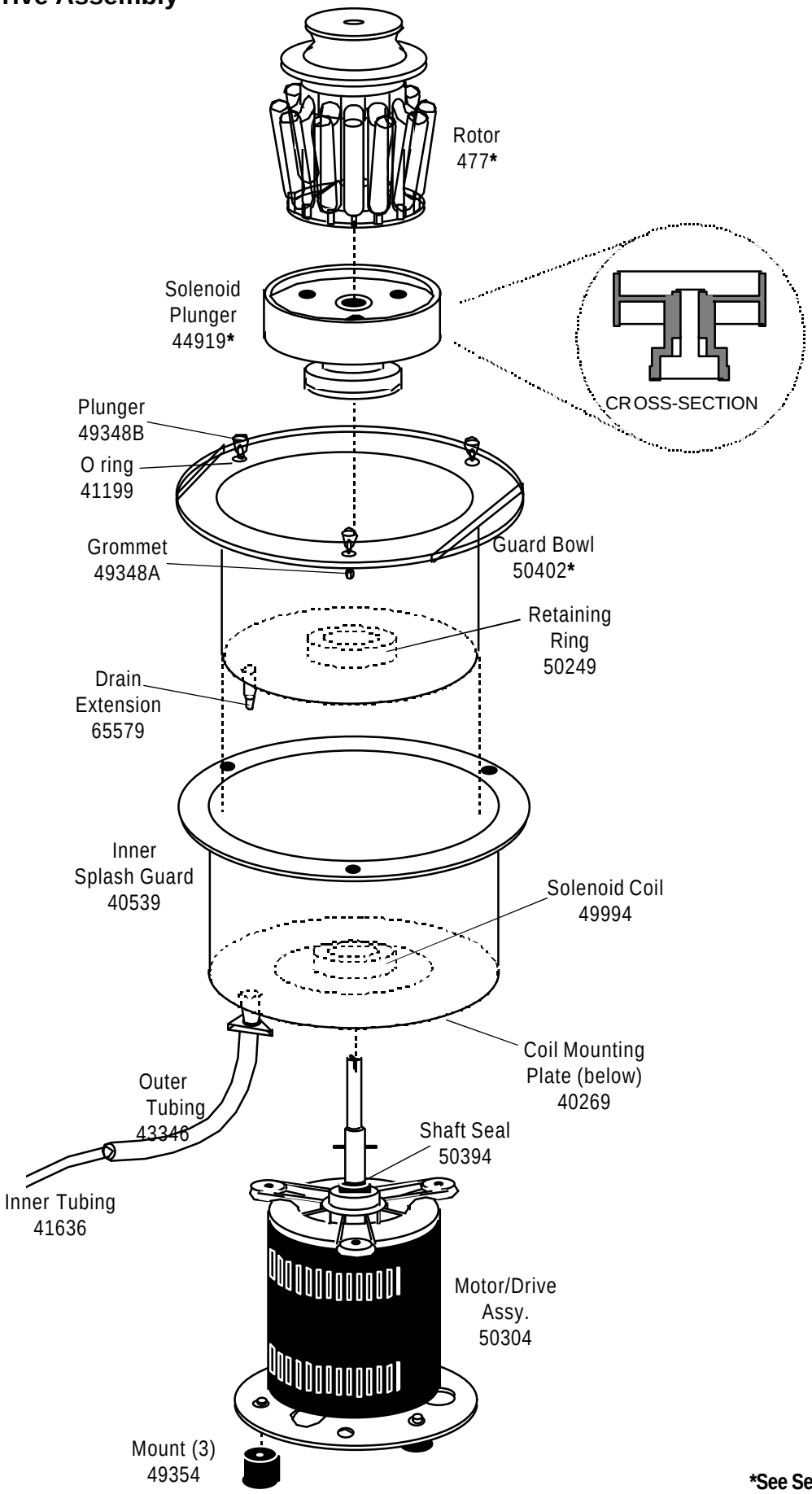


Figure 13-2 Drive Assembly



*See Section 11.6

Figure 13-3 Pump Assembly

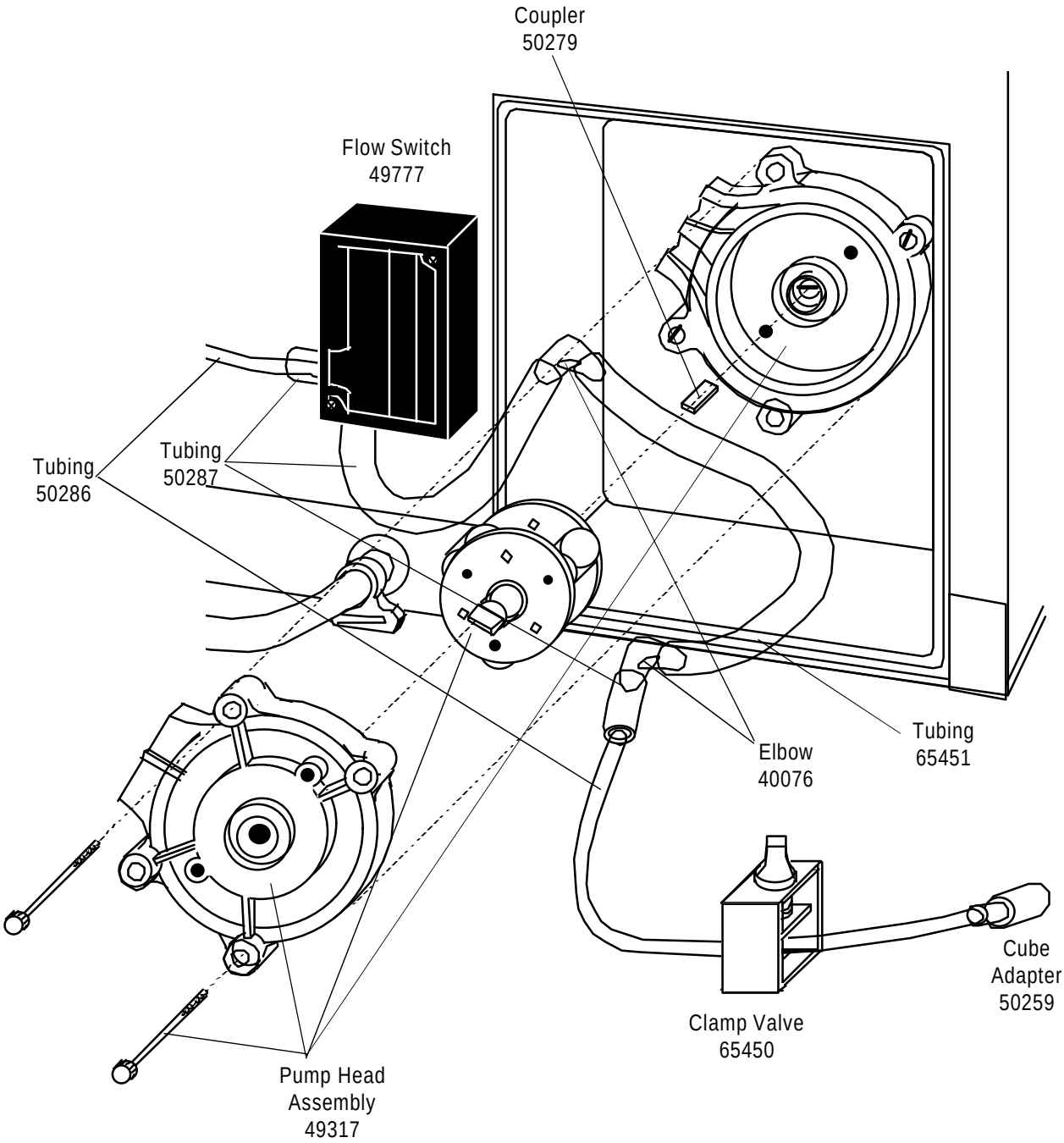
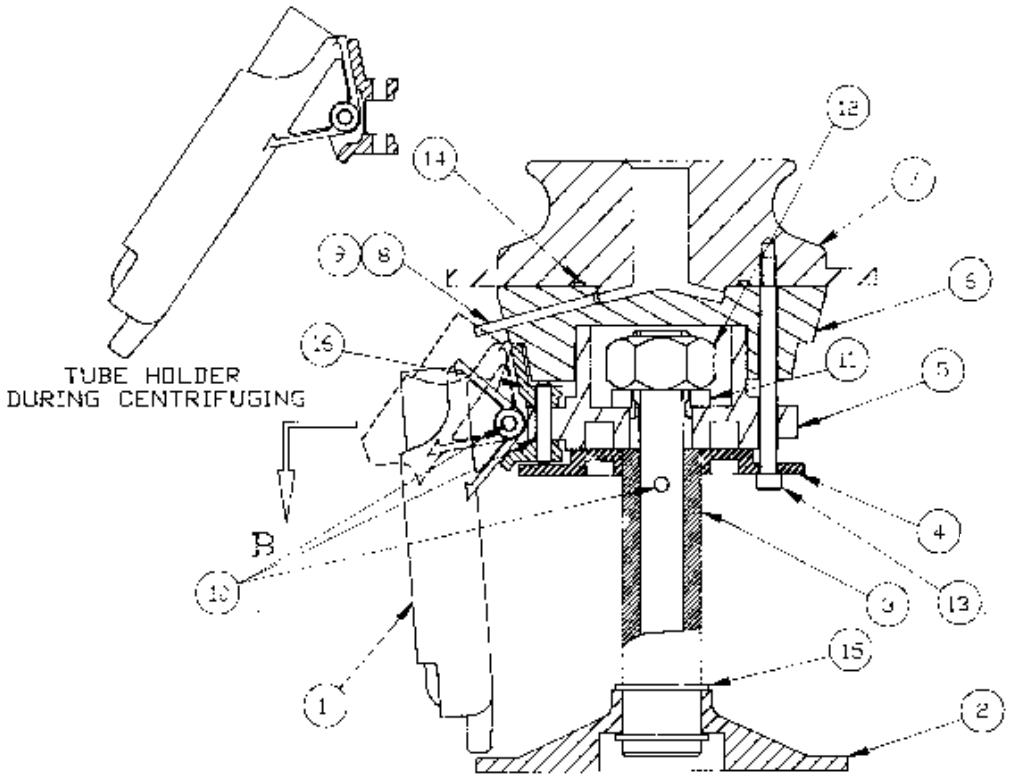


Figure 13-4 Rotor Assembly



Item	Description	Qty.	Part No.
1	Tubeholder	12	44924
2	Stand	1	44945
3	Shaft	1	44910
4	Deck	1	44907
5	Pivot Ring	1	44906
6	Filler Head	1	44920
7	Filler Head Cap	1	3666
8	Filler Tube	12	44904
10	Dowel Pin	25	44903
14	O ring	1	36211
16	Pivot	12	44921
17	Reflective Tape	1	50310